Nanoconverters: Remotely Coupled DC Power for Driving Nanodevices

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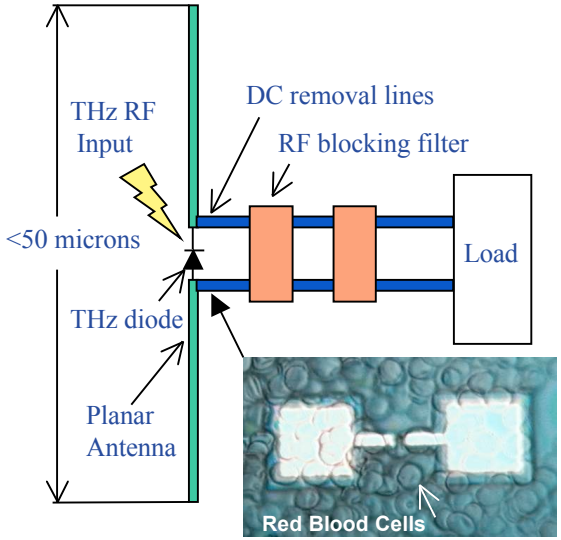

Left: Schematic of a nanoconverter. RF energy is incident (left) on the antenna/ diode combination (rectenna). DC is removed via a matched transmission line to the load (right). Many possible antenna arrangements can be used including slots, dipoles, spirals, log-periodic, bow-ties etc. depending upon the application and beam forming optics. *Below:* Blow up of diode surrounded by blood cells.

Description

➢ **PRODUCT DESCRIPTION:**

Monolithically fabricated NANOCONVERTERS for THz RF-to-DC power generation: Convert remotely generated THz RF power to DC for driving nanostructures without wires or batteries!

➢ **POTENTIAL USES:**

Remote field operation of free space or embedded nanostructures; spatially dispersed multiple target power distribution; high efficiency micron area antennas for communications; highly directional power beaming to remote or hostile areas.

➢ **UNDERLYING TECHNOLOGIES:**

Nanodiodes, THz RF coupling structures,microrectennas

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Innovative Claims/NASA Significance

- Provides direct RF to DC conversion to supply mW of drive power to nanostructures–remotely, without wires.
- Monolithically fabricated and customized to take input at frequencies from 100-10,000 GHz.
- Provides remote power transfer through space or solid structures such as plastics or skin via RF beams.
- Uses nanoscale Schottky diode rectifiers & micron area RF antenna coupling structures for small size/high efficiency
- Applications to all field deployable microsystems, THz sensors, bioengineering, nanofabrication, planar antennas

Plans

Key Milestones	YR 1	YR 2
Design microrectenna and THz diode rectifier	■	□
Work out fab techniques for rectifiers, filters, antennas	□ ■	□
Fabricate prototype rectenna elements	□ ■	□
Build test set for THz signal gen. & remote power beaming	□ ■	□
Measure rectenna efficiency and optimize power transfer	□	□ ■
Fabricate and test remotely powered nanodevice	□	□ ■
Proposed Allocation (people and facilities costs)	408.4K	421.1K